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**PATENT**
**Attorney Docket No.: SP01-253**

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

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| Inventor: | Boek, Heather D,. et al. | |
| Serial No: | 10/035,535 | Examiner: Hoffman, John M |
| Filing Date: | 10/26/2001 | Group Art Unit: 1731 |
| Title: | Methods and Apparatus for Forming a Chlorine Doped Optical Waveguide Preform | |

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## BRIEF ON APPEAL

This Brief supports the appeal to the Board of Patent Appeals and Interferences from the final rejection dated April 01, 2005, in the application listed above. Appellant filed the Notice of Appeal on April 22, 2005. Appellant now submits this Brief as required by 37 C.F.R. § 1.192(a).

## I. REAL PARTY IN INTEREST

The real party in interest in this appeal is Corning Incorporated.

## II. RELATED APPEALS AND INTERFERENCES

With respect to the related appeals or interferences that will directly affect, or be directly affected by, or have a bearing on the Board's decision in this appeal, there are no such appeals or interferences.

## III. STATUS OF CLAIMS

Claims 1 – 3, 6 – 31 and 36 – 37 were rejected in a final Office Action dated April 1, 2005. Those are the pending claims that are the subject of this Appeal and are set forth in the

attached Appendix.

## IV. STATUS OF AMENDMENTS

There are no amendments that have not been entered by the Examiner. The last amendment to the claims was made in the Amendment and Response which was filed on February 22, 2005.

## V. SUMMARY OF CLAIMED SUBJECT MATTER

Claim 1 relates to a method of manufacturing an optical waveguide preform. In particular, an optical waveguide preform is exposed to an atmosphere comprising a chlorine-containing compound, wherein the optical waveguide preform is doped with chlorine (page 5, lines 25-31). The atmosphere is at an absolute pressure substantially greater than about $1.013 \times 10^2$ kPa, i.e. substantially greater than one atmosphere (page 7, lines 1-3).

Claim 19 relates to a method of manufacturing an optical fiber preform. A soot preform is exposed to an atmosphere including a chlorine-contining gas. The absolute pressure of the atmosphere is substantially greater than $1.013 \times 10^2$ kPa, the mole percentage of chlorine present in the atmosphere is greater than about 20%, the temperature of the atmosphere is at least 1000°C and the chlorine-containing gas is selected from the group consisting of $Cl_2$, $CCl_4$, $SOCl_2$ and $POCl_3$ and combinations thereof. The weight percent of chlorine present in the soot preform is greater than about 1%.

Claim 36 relates to a method of manufacturing an optical waveguide preform. A soot preform is exposed to an atmosphere comprising a chlorine-containing gas wherein the absolute pressure of the atmosphere is substantially greater than $2.026 \times 10^2$ kPa (i.e. substantially greater than 2 atmospheres – page 7, lines 1-3) and the mole percentage of chlorine present in the atmosphere is between about 20% and 40% (page 7, lines 13-15). The method results in a chlorine-doped soot preform.

Claim 37 relates to a method of manufacturing an optical waveguide preform. A soot preform is exposed to an atmosphere comprising a chlorine-containing gas wherein the absolute pressure of the atmosphere is substantially greater than $4.052x10^2$ kPa (i.e. substantially greater than 4 atmospheres) and the mole percentage of chlorine present in the atmosphere is between about 20% and 40%. The method results in a chlorine-doped soot preform.

The present invention advantageously provides an optical fiber preform with an enhanced level of chlorine doping (page 3, lines 16-19). Such enhanced level of chlorine doping may provide improved viscosity matching between the chorine-containing layer of the preform and another layer, thereby reducing or minimizing the tensile or compressive stresses resulting from differential viscosities during the draw process (page 3, lines 20-24).

## VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The claims are currently rejected by the Patent Office as follows:

1) Claims 1 – 3, 6 – 31, 36 – 37 are rejected under 35 U.S.C. §103(a) as being unpatentable over Ishikawa (U.S. Patent No. 6,116,055).

## VII. ARGUMENT

The rejection of claims 1 – 3, 6 – 31, 36 – 37 as being unpatentable over 35 U.S.C. § 103(a) as being obvious over U.S. Patent No. 6,116,055 (Ishikawa) is improper

Applicants respectfully traverse the Examiner's rejection of claims 1 – 3, 6 – 31, 36 – 37 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,116,055 (Ishikawa).

A proper *prima facie* showing of obviousness requires the examiner to satisfy three requirements. First, the prior art relied upon, coupled with knowledge generally available to one of ordinary skill in the art, must contain some suggestion which would have motivated the skilled artisan to combine references. See In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d

1596, 1598 (Fed. Cir. 1988). Second, the examiner must show that, at the time the invention was made, the proposed modification had a reasonable expectation of success. See Amgen v. Chugai Pharm. Col, 927 F.2d 1200, 1209, 18 USPQ2d 1016, 1023 (Fed. Cir. 1991). Finally, the combination of references must teach or suggest each and every limitation of the claimed invention. See In re Wilson, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

With regard to claim 1, the Examiner points out that Ishikawa acknowledges the possibility of using a pressure greater than one atmosphere (see column 1, lines 60-65) and that Kingery supports the proposition that the higher the pressure of the gas, the higher the concentration of the solute, and it would therefore have been obvious to use as high a pressure as reasonably possible in the Ishikawa method so as to maximize the amount of chlorine in the preform.

Appellants disagree and submit that Ishikawa and Kingery at best provide incentive to try. "An 'obvious-to-try' situation exists when a general disclosure may pique the scientist's curiosity, such that further investigation might be done as a result of the disclosure, the disclosure itself does not contain a sufficient teaching of how to obtain the desired result, or that the claimed result would be obtained if certain directions were pursued.", In re Eli Lilly & Co., 14 USPQ2d 1741, 1743 (CAFC 1990).

Appellants assert that Ishikawa teaches nothing beyond the fact that use of a partial pressure greater than one atmosphere presents a problem. While Kingery may broadly suggest that increasing pressure can increase diffusion of a gas across a boundary or into a body, Kingery does not disclose or suggest exposing an optical fiber preform to chlorine at a pressure substantially greater than one atmosphere. Appellants contend that Ishikawa and Kingery, combined, at best merely suggest that it might be obvious to try chlorine doping at high pressure.

As the Federal Circuit has noted, "A general incentive does not make a particular result, nor does the existence of techniques by which those efforts can be carried out", In re Duel, 34 USPQ2d 1210, 1216 (CAFC 1995). Ishikawa makes no claim that doping at high pressure (e.g. substantially greater than one atmosphere) would be effective. Certainly the most obvious observation is that Ishikawa would undoubtedly have been aware of Fick's law and the other equations and laws cited by the Examiner, and yet armed with the knowledge of his own invention, the path Ishikawa chose was not one which included a total pressure substantially greater than one atmosphere, suggesting that knowledge of Fick's and other laws

was not sufficient motivation for Ishikawa to explore high pressure doping.

Even assuming, *arguendo*, that Ishikawa's reference to partial pressure greater than one atmosphere suggests a direction to explore, Ishikawa does not teach how one would do this, and neither does Kingery.

"In order to render a claimed apparatus or method obvious, the prior art must enable one skilled in the art to make and use the apparatus or method", Beckman Instruments Inc. v. LKB Produkter AB, 13 USPQ2d 1301, 1304 (CAFC 1989).

Ishikawa suggests a pressure in excess of one atmosphere presents a problem. However, Ishikawa provides no prescription for how one would go about overcoming that problem. That Ishikawa chose not to pursue high pressure doping due to an inherent problem, and discloses no other teaching other than to point out that problem, provides a *per se* argument that Ishikawa's disclosure is non-enabling, particularly as it relates to chlorine doping at a pressure substantially greater than one atmosphere. Again, Kingery does not cure this deficiency.

The Examiner asserts that it would be obvious to use as high a pressure as possible given the teachings of Ishikawa et al., Kingery and the ideal gas law. However, a showing of a suggestion to combine must be clear and particular, and hindsight must be rigorously avoided. Ecolochem Inc. v. Southern California Edison, 56 USPQ2d 1065 (CAFC 2000).

The Examiner begins with Appellants' disclosure as a blueprint, and then seeks references which, when combined, may yield Appellants' invention. As discussed *supra*, Ishikawa specifically discourages extending the partial pressure (let alone the total system pressure) above one atmosphere. Kingery, on the other hand, merely presents known principles of nature. With regard to Kingery, "..all inventions can be reduced to underlying principles of nature which, once known, make their implementation obvious...", Diamond, Commissioner of Patents and Trademarks v. Diehr and Lutton (450 U.S. 175, 209 USPQ 1 (SC 1981), footnote 12.) At best, this amounts to an obvious-to-try argument, as considered above.

The arguments above pertain equally to Appellants' claims 11 and 12.

With regard to claim 15, neither Ishikawa nor Kingery teach or suggest exposing a soot preform containing an element selected from the group consisting of germanium, fluorine, boron, phosphorous, erbium, antimony, aluminum, and titanium to a chlorine containing environment at a pressure substantially greater than one atmosphere. Indeed,

Ishikawa discloses that the porous preform is silica glass and does not contain other dopant materials. See for example, column 1, lines 41-47, column 3, lines 14-17 and Fig. 6. In particular, Fig. 6 depicts the refractive index profile of two optical fiber preforms. Figure 6(A) shows a core doped with germanium, and Fig. 6(B) shows a cladding doped with fluorine. However, Ishikawa makes clear (see Example 1, column 5, lines 25-50, and Example 2, column 5, line 52-column 6, line 3), that these portions of the optical fiber preform were manufactured by conventional means, prior to the deposition of porous silica glass which was doped with chlorine according to the method of Ishikawa.

Regarding claim 16, the Examiner argues that one could arbitrarily designate any preform to be "like" any other preform in that they are both preforms, or that they are both cylindrical. The Examiner further states that one can also designate what one constitutes as improvement as being either a reduction or an improvement...that the claim does not specify in which way a mismatch is improved.

To begin, Appellants' claim does not present an improvement in mismatching, but rather states that the matching of viscosity is improved. On its face, one of ordinary skill in the art would interpret the claim as referring to the closeness of the inner layer viscosity to the outer layer viscosity. This interpretation is made more clear, for example, by page 4, first paragraph of the as-filed application. With regard to "like", the word like is commonly used to denote similarity or sameness. The context of the claim is clear, in that the layer structure and viscosities of a first preform doped with chlorine are compared to the layer structure and viscosities of another preform, which, but for the chlorine doping, is substantially the same as the first preform. This is further clarified by the passage on page 8, lines 16-24 of the specification. One of ordinary skill in the art would have no difficulty interpreting the meaning of the claim within the context of the present invention

With regard to claim 19, for at least the reasons above, Appellants assert that the claim is non-obvious over the cited art. Ishikawa does not disclose exposing a soot preform to a chlorine-containing atmosphere having an absolute pressure substantially greater than one atmosphere, nor, as claimed in claims 25 and 26, having an absolute pressure greater than about two (or four atmospheres). Neither does Ishikawa, or Kingery, together or apart, disclose the soot preform exposed to the fluorine containing an element selected from the group consisting of germanium, fluorine, boron, phosphorous, erbium, antimony, aluminum and titanium, as presented in claim 30.

Regarding claims 36 and 37, for at least the reasons presented above, Appellants assert that the claims are non-obvious over the cited art. Neither Ishikawa nor Kingery, together or apart, disclose exposing a soot preform to an atmosphere including a chlorine-containing gas wherein the absolute pressure of the atmosphere is substantially greater than two atmospheres (or four atmospheres) and the more percentage of chlorine is between about 20% and 40%.

For at least the reasons given above, Appellants assert that the Examiner has failed to make a *prima facie* case of obviousness, and that the Board should reverse the §103 rejection and find that claims 1 – 3, 6 – 31, 36 – 37 are allowable over the prior art of record.

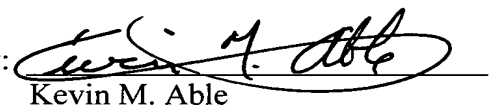
## Conclusion

In conclusion, Appellants request a reversal of each of the grounds of rejection maintained by the Examiner and prompt allowance of the pending claims Claims 1 – 3, 6 – 31, 36 – 37.

Please charge the fees due under 37 C.F.R. § 1.17(c) to Deposit Account No. 03-3325. If there are any other fees due in connection with the filing of this Brief on Appeal, please charge the fees to our Deposit Account No. 03-3325. If a fee is required for an extension of time under 37 C.F.R. § 1.136 not accounted for above, such an extension is requested and the fee should also be charged to our Deposit Account.

Respectfully submitted,

Dated: June 30, 2005

By: 

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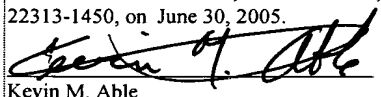

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## VIII. CLAIMS APPENDIX

The claims on appeal are as follows:

1. **(Rejected)** A method of manufacturing an optical waveguide preform, said method comprising:

exposing a soot preform to an atmosphere including a chlorine-containing gas and thereby doping the soot preform with chlorine, wherein the absolute pressure of the atmosphere is substantially greater than $1.013 \times 10^2$ kPa and the mole percentage of chlorine present in the atmosphere is between about 20% and 40%.

2. **(Rejected)** The method of Claim 1 including, prior to said step of exposing the soot preform, inserting the soot preform into a consolidation furnace.

3. **(Rejected)** The method of Claim 1 including:

drying the soot preform prior to said step of exposing the soot preform; and

sintering the soot preform following said step of exposing the soot preform.

4. **(Canceled)**

5. **(Canceled)**

6. **(Rejected)** The method of Claim 1 wherein the weight percentage of chlorine present in the soot preform is greater than about 1%.

7. **(Rejected)** The method of Claim 1 wherein the weight percentage of chlorine present in the soot preform is between about 1.0% and 1.5 %.

8. **(Rejected)** The method of Claim 1 wherein the chlorine-containing gas is selected from the group consisting of $GeCl_4$, $SiCl_4$, $Cl_2$, $CCl_4$, $SOCl_2$, $POCl_3$ and combinations thereof.

9. **(Rejected)** The method of Claim 1 wherein the atmosphere is at a temperature of at least about 1000 °C.

10. **(Rejected)** The method of Claim 1 wherein the atmosphere is at a temperature of between about 1250 and 1350 °C.

11. **(Rejected)** The method of Claim 1 wherein the absolute pressure of the atmosphere is greater than about $2.026 \times 10^2$ kPa.

12. **(Rejected)** The method of Claim 1 wherein the absolute pressure of the atmosphere is between about $4.052 \times 10^2$ and $16.32 \times 10^2$ kPa.

13. **(Rejected)** The method of Claim 1 including exposing the soot preform to the atmosphere for a period of at least 60 minutes.

14. **(Rejected)** The method of Claim 1 including exposing the soot preform to the atmosphere for a period of between about 60 and 180 minutes.

15. **(Rejected)** The method of Claim 1 wherein the soot preform includes silica and an element selected from the group consisting of germanium, fluorine, boron, phosphorous, erbium, antimony, aluminum, and titanium.

16. **(Rejected)** The method of Claim 1 including forming the optical waveguide preform such that the optical waveguide preform includes an inner layer formed from the chlorine doped soot preform and an outer layer surrounding the inner layer, wherein:

the inner layer and the outer layer are formed of materials having different viscosities at drawing temperatures in the range of between about 1600 and 2150 °C; and

the chlorine doping improves viscosity matching between the inner layer and the outer layer at said drawing temperatures as compared to a viscosity match between a corresponding inner layer and a corresponding outer layer of a like perform wherein the corresponding inner layer is not chlorine doped.

17. **(Rejected)** The method of Claim 16 wherein the inner layer includes silica and an element selected from the group consisting of germanium, fluorine, boron, phosphorous, erbium, antimony, aluminum and titanium.

18. **(Rejected)** The method of Claim 17 wherein the outer layer includes silica and an element selected from the group consisting of boron, phosphorous and fluorine.

19. **(Rejected)** A method of manufacturing an optical waveguide preform, said method comprising:

exposing a soot preform to an atmosphere including a chlorine-containing gas for a period of at least 60 minutes and thereby doping the soot preform with chlorine, wherein:

the absolute pressure of the atmosphere is substantially greater than $1.013 \times 10^2$ kPa;

the mole percentage of chlorine present in the atmosphere is greater than about 20%;

the weight percentage of chlorine present in the soot preform is greater than about 1%;

the chlorine-containing gas is selected from the group consisting of $GeCl_4$, $SiCl_4$, $Cl_2$, $CCl_4$, $SOCl_2$, $POCl_3$ and combinations thereof; and

the atmosphere is at a temperature of at least about 1000 °C.

20. **(Rejected)** The method of Claim 19 including, prior to said step of exposing the soot preform, inserting the soot preform into a consolidation furnace.

21. **(Rejected)** The method of Claim 19 including:

drying the soot preform prior to said step of exposing the soot preform; and

sintering the soot preform following said step of exposing the soot preform.

22. **(Rejected)** The method of Claim 19 wherein the mole percentage of chlorine present in the atmosphere is between about 20% and 40%.

23. **(Rejected)** The method of Claim 19 wherein the weight percentage of chlorine present in the soot preform is between about 1.0% and 1.5 %.

24. **(Rejected)** The method of Claim 19 wherein the atmosphere is at a temperature of

between about 1250°C and 1350 °C.

25. **(Rejected)** The method of Claim 19 wherein the absolute pressure of the atmosphere is greater than about $2.6 \times 10^2$ kPa.

26. **(Rejected)** The method of Claim 19 wherein the absolute pressure of the atmosphere is between about $4.052 \times 10^2$ and $16.32 \times 10^2$ kPa.

27. **(Rejected)** The method of Claim 19 including exposing the soot preform to the atmosphere for a period of between about 60 and 180 minutes.

28. **(Rejected)** The method of Claim 19 wherein the soot preform includes silica and an element selected from the group consisting of germanium, fluorine, boron, phosphorous, erbium, antimony, aluminum, and titanium.

29. **(Rejected)** The method of Claim 19 including forming the optical waveguide preform such that the optical waveguide preform includes an inner layer formed from the chlorine doped soot preform and an outer layer surrounding the inner layer, wherein:

the inner layer and the outer layer are formed of materials having different viscosities at drawing temperatures in the range of between about 1600 and 2150 °C; and

the chlorine doping improves viscosity matching between the inner layer and the outer layer at said drawing temperatures as compared to a viscosity match between a corresponding inner layer and a corresponding outer layer of a like perform wherein the corresponding inner layer is not chlorine doped.

30. **(Rejected)** The method of Claim 29 wherein the inner layer includes silica and a material selected from the group consisting of germanium, fluorine, boron, phosphorous, erbium, antimony, aluminum, and titanium.

31. **(Rejected)** The method of Claim 30 wherein the outer layer includes silica and an element selected from the group consisting of boron, phosphorous and fluorine.

32. **(Canceled)**

33. **(Canceled)**

34. **(Canceled)**

35. **(Canceled)**

36. (**Rejected**) A method of manufacturing an optical waveguide preform, said method comprising:

exposing a soot preform to an atmosphere including a chlorine-containing gas and thereby doping the soot preform with chlorine, wherein the absolute pressure of the atmosphere is substantially greater than $2.026 \times 10^2$ kPa and the mole percentage of chlorine present in the atmosphere is between about 20% and 40%.

37. (**Rejected**) A method of manufacturing an optical waveguide preform, said method comprising:

exposing a soot preform to an atmosphere including a chlorine-containing gas and thereby doping the soot preform with chlorine, wherein the absolute pressure of the atmosphere is substantially greater than $4.052 \times 10^2$ kPa and the mole percentage of chlorine present in the atmosphere is between about 20% and 40%.

## IX. EVIDENCE APPENDIX

None

## X. RELATED PROCEEDINGS APPENDIX

None